Trigeminocardiac Reflex in Neurosurgery – Current Knowledge and Prospects

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Sudden development of cardiac arrhythmia as far as cardiac arrest, arterial hypotension, apnea and gastric hypermobility as manifestations of the trigeminocardiac reflex (TCR) were initially described in 1870 by Kratschmer et al. (Kratschmer, 1870) after nasal mucosa manipulation in cats and rabbits. In 1908, Aschner and Dagnini presented the oculocardiac reflex (OCR) - nowadays considered as initial description of a peripheral subtype of TCR - which gained broad attention by ophthalmologist (Blanc, et al., 1983). In 1977 Kumada et al. (Kumada, et al., 1977) described similar autonomic “trigeminal depressor” responses after low frequency electrical stimulation within portions of the trigeminal complex in anaesthetized or decerebrated rabbits, indicating that not only peripheral but also central stimulation of parts of the trigeminal pathway results in autonomic reflex responses. In 1988 the term “trigeminocardiac reflex” was introduced by the anaesthetists Shelly and Church (Shelly and Church, 1988). In 1999, Schaller et al. (Schaller, et al., 1999) initially described the occurrence of central TCR in human after stimulation of central parts of the trigeminal nerve during cerebellopontine angle and brain stem surgery. It was then Schaller who merged the two entities of peripheral and central TCR to a common concept, which is now generally accepted.

This chapter introduces the TCR, which has gained broad attention in the field of neurosurgery. In the past years, TCR has been reported to occur during several other neurosurgical procedures such as transsphenoidal surgery (Schaller, 2005a), Jannetta microvascular decompression (Schaller, 2005b), percutaneous radiofrequency thermocoagulation and percutaneous microcompression of the trigeminal ganglion (Meng, et al., 2008), neuroendovascular approaches in neurosurgery (Amiridze, et al., 2009, Lv, et al., 2010, Lv, et al., 2007, Ong, et al., 2010), and during aneurysm clipping (Spiriev, et al., 2011a). As the TCR may have decisive impact on the surgical course as well as the postoperative functional outcome of neurosurgical patients with skull-base pathologies, the awareness of the TCR is essential for everyone involved in the treatment of those patients. Therefore, in the following chapter we provide the current knowledge on TCR with respect to its risk and predisposing factors, its clinical implementation in neurosurgery,
preventive and therapeutical means and its influence on functional outcome. Above that, we delineate the role of the TCR as an oxygen-conserving reflex and present future aspects on TCR research.

**keywords**
trigeminocardiac reflex, oxygen-conserving reflex

**type**
book chapter (English)

**book title**
Explicative Cases of Controversial Issues in Neurosurgery

**date of publishing**
2012

**publisher**
INTECH open science

**ISBN number**
978-953-51-0623-4

**pages**
3-18